PHASE II SAMPLING DESIGN REQUIREMENTS FOR AMBIENT AIR AT LIBBY OU3 2008

1.0 INTRODUCTION

Operable Unit 3 (OU3) of the Libby Asbestos Superfund Site includes the area occupied by the former vermiculite mine as well as surrounding lands that have been or continue to be contaminated by LA (Libby amphibole) releases from the mine.

One means by which lands near the mine may be impacted by mining-related releases is through airborne transport (past and/or present) of LA asbestos fibers released from the mined area. However, adequate data on the levels of past and current airborne releases from the site are not presently available. This memo specifies the general design requirements of an ambient air sampling program to be implemented in 2008 as part of Phase II of the Remedial Investigation for OU3. The initial goal of this sampling effort is the following:

- Characterize the current levels of release of LA from the mine site into ambient air

If the level of release from the site is below a level of concern, the additional sampling will not be required. If releases from the mine site to off-site air approach or exceed EPA's level of concern, then additional studies may be needed to achieve the following:

- Characterize the on-site locations and media that are the primary sources of off-site release
- Characterize the airborne dispersion of the LA particles as a function of distance and direction from the mine.

These data (both the initial phase and the subsequent phase, if needed) will help support an evaluation of the fate and transport of LA particles in air, as well as an evaluation of risks to human receptors from LA in ambient air both on and also around the mine site. These evaluations, in turn, will help determine if current releases to air are unacceptable and require remedial action to reduce or eliminate the releases.

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The details of how the design will be achieved will be developed in an Ambient Air Sampling and Analysis Plan (SAP) to be developed by Remedium.

2.0 SUMMARY OF EXISTING DATA

Based on meteorological data collected at the mine site, the predominant direction of wind flow at the mine is to the northeast (Figure 1), so it is expected that current releases and historic

impacts are likely to be greater in this direction. However, because of the variability in wind direction, releases and impacts are possible in other directions as well.

To date, three studies have been performed as part of the Phase I investigation under the OU3 remedial Investigation to obtain preliminary data on the extent of contamination associated with this pathway. These three studies are summarized briefly below.

- Phase I Ambient Air Study. A set of eight ambient air monitoring stations were established in the vicinity of the mined area. Four samples were collected from each station, with each sample representing a 5-day composite collected between October 2 and October 22, 2007. The purpose of these samples was to obtain preliminary data on the level of LA that is currently being released from the mine site. All of the samples were non-detect for LA, at an average analytical sensitivity of 5.5E-04 cc^{-1}. No LA was detected, but the results must be interpreted cautiously because sampling occurred during and after a wet period that may have substantially reduced emissions compared to dry conditions.
- Phase I Forest Soil Study. Forest soil samples were collected from multiple stations along seven transects radiating outwards from the mined area. Each sample was analyzed for LA by polarized light microscopy using a visual area estimation method (PLM-VE). Results are shown in Figure2. As seen, LA was observed in some samples, generally within a few miles of the site. One limitation to this approach is that the sensitivity of PLM-VE is about 0.2%, so historic impacts to soil below this level may not be detectable. It is unknown at this time if measurable quantities of naturally occurring LA have contributed to these results or not.
- Phase I Tree Bark Study. As part of Phase I, samples of bark from trees at least 30 years old were collected at the same locations as the forest soil samples (see Figure 2), and each was analyzed for LA. The results are shown in Figure 3. As seen, although there is moderate spatial variability, there is a general tendency for most of the highest levels (> 2.5 million fibers per cm^2) to occur within about 2 to 3 miles of the mined area, with a tendency for values to diminish as a function of distance from the mine. Elevated values are noted not only in the downwind direction (north-northeast from the mine), but also along nearly all transects. It is suspected that the majority of the LA in tree bark is attributable to historic releases to air during the time the mine was active, although current and on-going releases may also be contributing.

Comment [R1]: Are bark results releasable yet?

3.0 SAMPLING DESIGN

As noted above, the initial objective of the ambient air study is to characterize the current levels of LA release to air from the mine site. To this end, a total of eight stationary ambient air monitors will be established around the perimeter of the mined area. The locations of these monitoring stations are shown in Figure 4. As indicated, 5 of the 8 stations are located to the

north of the mined area, since available meteorological data indicate that the predominant wind direction is to the north-east. However, 3 stations are located along the southern perimeter to capture any releases that may occur during wind reversals.

As noted above, if the data from the initial ambient air monitoring phase suggest that there are frequent and significant releases from the mined area, then additional sampling stations may be added to identify the sources of the releases and to evaluate the dispersion of the releases.

3.3 Sample Collection Protocol

Ambient air samples will be collected using a protocol similar to that used in the Phase I ambient air sampling program. Because the objective of the sampling effort is to estimate long-term average concentration values, all ambient air samples should be collected using low-flow (2 L/min) stationary air monitors over a 5 day sampling period. In no event shall a sample be collected at a flow rate lower than 0.92 L/min, since the linear flow velocity would fall below 4 cm/sec, which is the minimum velocity specified by ISO 10312.

Samples will be collected using 25-mm diameter, 0.8 µm pore size MCE filter cassettes. All samples will be collected at a height approximately 6 feet above ground level.

Equipment shelters will be used to house the sampling pumps. The use of these shelters will protect the sampling equipment from adverse weather conditions that would otherwise interfere with the collection of long-term samples.

3.4 Sample Collection Schedule

Sampling will begin in the spring of 2008 as soon as weather conditions allow (estimated to be about mid-May), and will continue through the fall of 2008 until weather conditions prohibit further sampling (estimated to be approximately mid-October). Samples will be collected from each station on a bi-weekly schedule (one sample per two weeks). This corresponds to about 12 sampling rounds, or a total of about 96 samples.

Monitors will be checked periodically during each round of sample collection to identify and correct any problems.

3.5 Field QC Samples

One field blank shall be collected per sampling round.

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3.6 Analytical Method and Counting/Stopping Rules

All air samples collected during Phase II will be submitted to the analytical laboratory for asbestos analysis using transmission electron microscopy (TEM) in accord with the International Organization for Standardization (ISO) 10312 method (ISO 1995) counting protocols, with all applicable Libby site-specific laboratory modifications.

Initially (including the first two rounds of sampling), all samples will be analyzed. Depending on the results of these initial rounds, EPA may issue a directive to the analytical laboratory indicating that only a subset of the samples collected in subsequent rounds require analysis. If so, the laboratory shall archive all unanalyzed filters in case analysis is determined to be required in the future.

For each sample that is identified for analysis, all amphibole structures (including not only LA but all other asbestos types as well) that have appropriate Selective Area Electron Diffraction (SAED) patterns and Energy Dispersive X-Ray Analysis (EDXA) spectra, and having length greater than or equal to 0.5 um and an aspect ratio (length:width) $\geq$ 3:1, will be recorded on the Libby site-specific laboratory bench sheets and electronic data deliverable (EDD) spreadsheets. Data recording for chrysotile (if observed) is not required.

The target analytical sensitivity will be 0.001 cc^{-1}. Assuming that typical sample volumes for ambient air samples will be about 5,000-10,000 L and indirect preparations are not necessary, it is expected that an analytical sensitivity of 0.001 cc^{-1} can be achieved by counting about 5-10 TEM grid openings (GOs).

For field samples, count the sample until one of the following is achieved:

- The target sensitivity is achieved
- 50 LA structures are observed
- 50 grid opening are evaluated

When one of these goals is achieved, complete the final grid opening and stop.

For field blanks, count 10 grid openings and stop.

3.7 Data Reporting

All ambient air data will be recorded using the most recent version of the Libby TEM EDD for air samples. After data entry and validation by the laboratory, EDDs will be transmitted electronically to:

LibbyOU3@syrres.com

When files are too large to transmit by e-mail, they should be provided on compact disk to the following address:

Lynn Woodbury
Syracuse Research Corporation
999 18th Street, Suite 1975
Denver CO 80202